Sedimentation of binary colloids : Brazil nuts and icebergs(Poster session 1, New Frontiers in Colloidal Physics : A Bridge between Micro- and Macroscopic Concepts in Soft Matter)

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The hard sphere is *the* basic system of statistical mechanics, widely investigated but still rich of unknown phenomenon. We use binary colloidal solutions as a good approximation for binary hard-sphere mixtures [1]. And colloids are sufficiently large to be distinguished to single particle resolution by confocal microscopy. We focus on a system with majority species being smaller than the minority species by a factor 2.

Experimental observations lead us to think about a yet unconsidered [2] binary fluid + one component crystal equilibrium, the crystal being made of the majority species. Taking this phase coexistence as a hypothesis, we study theoretically [3] the phase behavior and the sedimentation [4] of our colloid mixture.

Going further, we also investigate experimentally the sedimentation of the same colloidal solution with added non adsorbing polymers. The depletion interaction between colloids (Asakura Oosawa potential) [5] [6] induced by the polymers leads to a wealth of phases and sedimentation behaviors not yet fully explained.

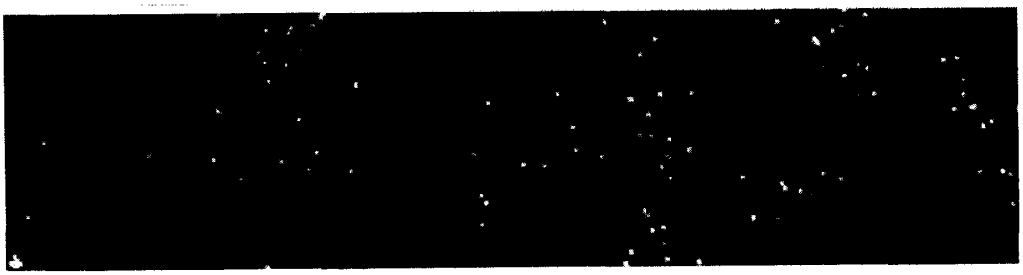

Figure 1: binary fluid + one component crystal

References

[1] Dijkstra, M., van Roij, R. & Evans, R. *Phys. Rev. E* **59**, 5744 (1999).

[2] Fasolo, M. & Sollich, P. *Phys. Rev. Lett.* **91**, 6 (2003).

[3] Hansen-Goos, H. & Roth, R. *J. Chem. Phys.* **124**, 154506 (2006).

[4] Schmidt, M., Dijkstra, M. & Hansen, J.-P. *J. Phys. Condens. Matter* **16**, 4185 (2004).

[5] Asakura, S. & Oosawa, F. *J Chem Phys* **22**, 1255–1256 (1954).

[6] Lekkerkerker, H. N. W., Poon, W. C. K., Pusey, P. N., Stroobants, A. & Warren, P. B. *Europhys. Lett.* **20**, 559–564 (1992).

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